

What is claimed is:

1       1. A method for coating an implant comprising the  
2 steps of

3               (a) contacting the implant with an aqueous  
4 solution of magnesium, calcium, and phosphate ions;

5               (b) passing a gaseous weak acid through the  
6 aqueous solution;

7               (c) degassing the aqueous solution; and

8               (d) allowing the magnesium, calcium, and  
9 phosphate ions to precipitate onto the implant to form a  
10 coating.

1       2. The method of claim 1 wherein the gaseous weak  
2 acid is carbon dioxide.

1       3. The method of claim 1 wherein the implant is  
2 formed from one or more of metal, organic material, polymer  
3 or ceramic.

1       4. The method according to claim 1 wherein the  
2 calcium and phosphate ions are present in the aqueous  
3 solution in a molar ratio of between about 1 to about 3.

1       5. The method according to claim 1 wherein the  
2 calcium and phosphate ions are present in the aqueous  
3 solution in a molar ratio of between about 1.5 to about  
4 2.5.

1       6. The method according to claim 1 wherein the  
2 aqueous solution comprises about 0.5 to about 50 mM calcium  
3 ions and about 0.5 to about 20 mM phosphate ions.

4       7. The method according to claim 1 wherein the  
5 aqueous solution comprises about 2.5 to about 25 mM calcium  
6 ions and about 1.0 to about 10 mM phosphate ions.

1       8. The method according to claim 1 wherein the  
2 aqueous solution comprises about 0.1 to about 20 mM  
3 magnesium ions.

1       9. The method according to claim 1 wherein the  
2 aqueous solution comprises about 1.5 to about 10 mM  
3 magnesium ions.

1       10. The method according to claim 1 wherein the  
2 aqueous solution comprises no carbonate ions or less than  
3 about 50 mM carbonate ions.

1       11. The method according to claim 1 wherein the  
2 aqueous solution comprises no carbonate ions or less than  
3 about 42 mM carbonate ions.

1       12. The method according to claim 1 wherein the  
2 aqueous solution comprises an ionic strength in the range  
3 of about 0.1 to about 2 M.

1       13. The method according to claim 1 wherein the  
2 aqueous solution comprises an ionic strength in the range  
3 of about 0.15 to about 1.5 M.

1       14. The method according to claim 1 wherein the  
2 gaseous weak acid is passed through the aqueous solution at  
3 a pressure of about 0.1 to about 10 bar.

1       15. The method according to claim 1 wherein the  
2 gaseous weak acid is passed through the aqueous solution at  
3 a pressure of about 0.5 to about 1.5 bar.

1       16. The method according to claim 1 wherein the  
2 aqueous solution has a temperature in the range of between  
3 about 5°C to about 80°C.

1        17. The method according to claim 1 wherein the  
2        aqueous solution has a temperature in the range of between  
3        about 5°C to about 50°C.

1        18. The method according to claim 1 wherein the  
2        implant is treated by a mechanical or chemical surface  
3        treatment prior to contacting the implant with the aqueous  
4        solution.

1        19. The method of claim 18 wherein the implant is  
2        treated by sand-blasting, scoring, polishing or grounding.

1        20. The method of claim 18 wherein the implant is  
2        treated by contacting with strong mineral acid or an  
3        oxidizing agent in a manner to etch the implant.

1        21. The method of claim 1 wherein the coating  
2        comprises magnesium ions, calcium ions and phosphate ions  
3        and one or more ions selected from the group consisting of  
4        hydroxide, carbonate, chloride, sodium and potassium.

1        22. The method of claim 1 wherein the coating  
2        comprises one or more of amorphous carbonate calcium  
3        phosphate, hydroxyapatite, calcium deficient and hydroxyl  
4        carbonate apatite, octacalcium phosphate, dicalcium  
5        phosphate dihydrate or calcium carbonate.

1        23. The method of claim 1 wherein the coating has a  
2        thickness of about 0.5 to about 100 microns.

1        24. The method of claim 1 wherein the coating has a  
2        thickness of about 0.5 to about 50 microns.

1        25. The method of claim 1 further comprising the step  
2        of contacting a coated implant with a calcifying solution  
3        comprising calcium and phosphate ions, and allowing a  
4        precipitate layer of calcium and phosphate ions to form on  
5        the coated implant.

1        26. A device for coating an implant comprising  
2                (a) reactor vessel;  
3                (b) heating element operatively connected to the  
4        reactor vessel;  
5                (c) implant support;  
6                (d) stirrer disposed within the reactor vessel;  
7                (f) inlet and outlet operatively connected to  
8        the reactor vessel; and  
9                (g) controlled source of carbon dioxide  
10      operatively connected to the inlet.